

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 18-38 are pending in the present application. Claims 18, 25, 27, 28, 30, 31, 33, and 34 are amended and Claims 35-38 are added by the present amendment. New Claim 35 finds support at least in previously presented Claims 18, 32, and 33, new Claims 36 and 37 find support at least in previously presented Claims 18 and 28, and new Claim 38 finds support at least in previously presented Claim 18 and the originally filed specification at page 18, lines 1-13. No new matter is added.

In the outstanding Office Action, a reference provided in an Information Disclosure Statement (IDS) was indicated as not having been considered; the specification was objected to; Claim 28 was objected to; Claims 33 and 34 were rejected under 35 U.S.C. §112, second paragraph; Claims 18-26 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,959,302 to Charpak; Claims 27 and 30 were rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of Jeavons et al. (herein “Jeavons”); Claim 29 was rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of Jeavons and U.S. Patent No. 5,633,501 to Amleshi et al. (herein “Amleshi”); Claim 31 was rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of U.S. Patent No. 4,476,390 to Hanawa; Claims 32 and 33 were rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of U.S. Patent No. 4,816,683 to Marsden; Claim 34 was rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of Marsden and U.S. Patent No. 4,427,870 to Inoue; and Claim 28 was indicated as allowable if rewritten in independent form.

Initially, applicants gratefully acknowledge the Examiner’s indication of allowable subject matter in Claim 28. Accordingly, new Claim 36 includes the limitations of previously

presented Claim 18 and Claim 28, which was indicated as allowable if rewritten in independent form. In addition, new Claim 37 is added to present features similar to Claim 36 with a slightly varied scope. Accordingly, new Claims 36 and 37 are believed to be allowable.

In addition, applicants and applicants' representatives thank the Examiner for the courtesy of a personal interview with applicants' representatives on April 22, 2004. During the interview, the rejections noted in the outstanding Office Action were discussed, and the Examiner agreed to reconsider the claims based on the arguments presented. Arguments and claim amendments presented during the interview are reiterated below. In addition, new arguments are presented below to further distinguish the claimed invention over the cited references.

During the interview, the Examiner indicated that French Patent No. 2 739 941 identified in the IDS filed November 26, 2001 was not considered because a copy of this reference was not in the file, although corresponding U.S. Patent No. 6,133,575 was available. Accordingly, a copy of French Patent No. 2 739 941, dated April 18, 1997, is provided and applicants respectfully request that the Examiner indicate consideration of this reference.

Further, regarding the objection to the specification, a substitute specification is provided including the corrections identified in the outstanding Office Action, as well as correction of other minor informalities. It is believed no new matter is added.

In addition, regarding the objections to Claim 28 and the rejections of Claims 33 and 34 under 35 U.S.C. § 112, second paragraph, Claims 28, 33, and 34 are amended in light of the comments in the outstanding Office Action. Accordingly, it is respectfully requested these objections and rejections be withdrawn.

Claims 18-26 were rejected under 35 U.S.C. § 102(e) as anticipated by Charpak.

Applicants respectfully traverse that rejection.

Claim 18 is directed to a multi-dimensional detector for incident ionizing radiation comprising primary particles whose energies are greater than or equal to 100 keV. The detector includes a block of converting material configured to release secondary particles by interaction with the incident ionizing radiation. A thickness of the block is at least equal to one-tenth of a mean free path traveled by the incident ionizing radiation through the converting material. The detector also includes parallel slits crossing the block, the slits filled with a fluid configured to interact with the secondary particles to produce tertiary particles indicative in intensity and position of the incident ionizing radiation. Further, the block is positioned to ensure that the incident ionizing radiation comes in on a first block face where the slits terminate, and a first dimension of a cross-section of at least one of the parallel slits measured in a plane parallel to the first block face is greater than a second dimension of the cross-section of the at least one of the parallel slits measured in the plane parallel to the first block face. New independent Claim 38 recites similar features using the term “hole” instead of “slit.”

In a non-limiting example, Figures 2 and 3 illustrate an embodiment of a multi-dimensional detector that includes slits 14 that terminate on a first block face 7 where the incident radiation 9 enters the block. A cross-section of the slits 14 forms an elongated rectangular shape having one dimension L, measured in a plane parallel to first block face 7, that is larger than a width dimension perpendicular to L but also measured in the plane parallel to first block face 7. For example, in the embodiment described at page 18, lines 1-13, the slit dimension L varies from 10 cm to 50 cm which is greater than the slit width dimension, which is 500 μ m.

This arrangement of slits advantageously results in a detector with superior performance and spatial resolution that may be manufactured at a lower cost, when compared to conventional detectors, including convention detectors with circular hole openings. For example, the specification indicates that “the performance levels of hole-system detectors are limited since only between 10% to 30% of the secondary electrons created in the course of each gas ionization are collected.”¹

Applicants respectfully note that Charpak does not disclose a multi-dimensional detector that includes parallel slits crossing the block having one cross-sectional dimension greater than another cross-sectional dimension. Further, Applicants respectfully traverse the statement in the outstanding Office Action that Charpak discloses parallel slits crossing the block at column 8, lines 5-13 and column 7 lines 15-27 and column 14, lines 1-9.² Charpak describes a multi-channel structure (e.g., detector) 121 with a microchannel structure provided with parallel channels. However, these parallel channels are configured as tubes and not slits. “The diameter of each channel 121...can be between 10 and 30 micron meters”³ In other words, the microchannels disclosed by Charpak are tube-like openings having circular cross-sections “with the same dimension T as the array of holes 130i, existing on the grid forming the second electrode 13.”⁴ Thus, the cross-sectional dimension T is the same in each direction and forms a circle.

Further, the holes through the block “can be formed by glass tubes placed side by side” and have a cross-sectional dimension T in a plane parallel to the front block face as shown in Figure 2B. Thus, the microchannels of Charpak have cross-sectional dimensions that are the same in each direction (i.e., circular) and thus, are not slits having a first dimension that is greater than a second dimension, as found in the claimed invention.

¹ Specification at page 2, lines 28-29.

² Office Action mailed December 31, 2003 at page 5, lines 13-14.

³ Charpak at column 8, lines 29-30.

⁴ Charpak at column 8, lines 11-13.

Accordingly, it is respectfully submitted that Charpak does not teach or suggest a multidimensional detector that includes “a first dimension of a cross-section of at least one of the parallel slits measured in a plane parallel to the first block face is greater than a second dimension of the cross-section of the at least one of the parallel slits measured in the plane parallel to the first block face,” as in independent Claims 18.

Accordingly, it is respectfully submitted that independent Claims 18 and 38, and claims depending therefrom, are allowable.

Claims 27 and 29-34 were rejected under 35 U.S.C. § 103(a) as unpatentable over Charpak in view of Jeavons, Amleshi, Hanawa, Marsden or Inoue. Those rejections are respectfully traversed. Claims 27 and 29-34 depend from independent Claim 18, which as indicated above is believed to be allowable. Further, applicants respectfully note that Jeavons, Amleshi, Hanawa, Marsden, and Inoue also do not teach or suggest the features of independent Claim 18. Accordingly, it is respectfully requested those rejections also be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present amendment is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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